WHAT IS CLAIMED IS:

1. A plasma reactor comprising:

a first electrode in the shape of a needle;

a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode; and

power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode and said second electrode are disposed in a passage space of a target fluid for treating said target fluid by causing streamer discharge between said first and second electrodes, and

said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees.

2. The plasma reactor of Claim 1,

wherein said point angle θ of said first electrode is not less than 60 degrees and not more than 90 degrees.

3. The plasma reactor of Claim 2,

wherein said point angle θ of said first electrode is substantially 60 degrees.

4. The plasma reactor of Claim 2,

wherein said point angle θ of said first electrode is substantially 80 degrees.

5. The plasma reactor of Claim 1,

wherein said pointed portion of said first electrode is in a spherical shape.

6. The plasma reactor of Claim 1,

wherein said first electrode has a needle-shaped effective length L not less than 4 mm and not more than 30 mm.

7. The plasma reactor of Claim 1,

wherein said pointed portion of said first electrode has a curvature radius R not less than 0.1 mm and not more than 0.7 mm.

8. The plasma reactor of Claim 1,

wherein a ratio L/G between a needle-shaped effective length L of said first electrode and an electrode gap G is not less than 0.2 and not more than 1.5.

9. The plasma reactor of Claim 1,

wherein a ratio L/D between a needle-shaped effective length L and a diameter D of said first electrode is not less than 2 and not more than 15.

10. The plasma reactor of Claim 1,

wherein a ratio R/G between a curvature radius R of said pointed portion of said first electrode and an electrode gap G is not less than 0.005 and not more than 0.035.

11. The plasma reactor of Claim 1,

wherein a ratio R/D between a curvature radius R of said pointed portion of said first electrode and a diameter D of said first electrode is not less than 0.05 and not more than 0.35.

12. The plasma reactor of Claim 1,

wherein a needle-shaped effective length L of said first electrode, an electrode gap G and said point angle θ of said first electrode satisfy the following formula:

$0.25 \leq L/(G\theta) \leq 1.2$.

13. The plasma reactor of Claim 1,

wherein a needle-shaped effective length L and said point angle θ of said first electrode satisfy the following formula:

$5 \leq L/\theta \leq 24$.

14. The plasma reactor of Claim 1,

wherein said second electrode has an opening through which said target fluid passes.

15. The plasma reactor of Claim 1, further comprising a treatment member for treating said target fluid,

wherein said treatment member is disposed between or downstream of said first electrode and said second electrode.

16. The plasma reactor of Claim 15,

wherein said treatment member is disposed between said first electrode and said second electrode and in the vicinity of said second electrode.

17. The plasma reactor of Claim 15,

wherein said treatment member has a catalytic substance for accelerating the treatment of said target fluid.

18. The plasma reactor of Claim 17,

wherein said catalytic substance includes at least one element selected from the group consisting of Pt, Pd, Ni, Ir, Rh, Co, Os, Ru, Fe, Re, Tc, Mn, Au, Ag, Cu, W, Mo and Cr.

19. The plasma reactor of Claim 17,

wherein said catalytic substance includes not less than 10 mass% and not more than 60 mass% of a manganese-based catalyst.

20. The plasma reactor of Claim 19,

wherein said catalytic substance includes not less than 30 mass% and not more than 40 mass% of said manganese-based catalyst.

21. The plasma reactor of Claim 17,

wherein said treatment member includes, as said catalytic substance, a mixture of a manganese oxide and an oxide of at least one of iron, cerium, europium, lanthanum and

copper, or a composite oxide of manganese and at least one of one of iron, cerium, europium, lanthanum and copper.

22. The plasma reactor of Claim 21,

wherein said manganese oxide has a composition ratio not less than 20% and not more than 50% in said catalytic substance.

23. The plasma reactor of Claim 21,

wherein said treatment member includes, as said catalytic substance, a plurality of kinds of manganese oxides respectively having different oxidation numbers.

24. The plasma reactor of Claim 15,

wherein said treatment member includes an adsorbent for adsorbing a target component included in said target fluid.

25. The plasma reactor of Claim 24,

wherein said adsorbent is at least one of porous ceramic, activated carbon, activated carbon fiber, zeolite, mordenite, ferrierite and silicalite.

26. The plasma reactor of Claim 1,

wherein said first electrode is disposed on an upstream side of a flow of said target fluid, and

said second electrode is disposed on a downstream side of the flow of said target fluid.

27. The plasma reactor of Claim 1,

wherein said first electrode and said second electrode are alternately disposed along a flow of said target fluid.

28. The plasma reactor of Claim 1,

one first electrode is disposed on one side of said second electrode and another first electrode is disposed on the other side of said second electrode.

29. The plasma reactor of Claim 1,

wherein said power supply means is a pulse source for supplying a pulse with gentle rise and fall.

30. The plasma reactor of Claim 1,

wherein said power supply means is an AC power supply.

31. The plasma reactor of Claim 1,

wherein said power supply means is a DC power supply.

32. The plasma reactor of Claim 1,

wherein said first electrode and said second electrode are plural in number and are disposed along a flow of said target fluid.

33. The plasma reactor of Claim 1,

wherein said first electrode has needle electrodes, and

said needle electrodes are dispersedly arranged on a cross-sectional plane of the passage space.

34. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of target air in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees, and

an odor component or a toxic component included in said target air is treated by

allowing said target air to pass a discharge field of streamer discharge caused between said first and second electrodes.

35. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a target gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees, and

a nitrogen oxide included in said target gas is treated by allowing said target gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

36. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a flue gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees, and

a nitrogen oxide, unburnt fuel and hydrocarbon included in said flue gas are treated by allowing said flue gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

37. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a flue gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees, and

dioxin included in said flue gas is treated by allowing said flue gas to pass a discharge field of streamer discharge caused between said first and second electrodes.

38. Purification equipment comprising:

a casing; and

a plasma reactor contained in a passage space of a flon gas in said casing and including a first electrode in the shape of a needle, a second electrode in the shape of a plate disposed to oppose and to be substantially perpendicular to said first electrode, and power supply means connected to said first and second electrodes for applying a discharge voltage,

wherein said first electrode has a pointed portion as an end thereof on the side of said second electrode and said pointed portion has a point angle θ not less than 30 degrees and not more than 90 degrees, and

said flon gas is treated by allowing said flon gas to pass a discharge field of streamer discharge caused between said first and second electrodes.